

CHAPTER 24.05

GAS PIPING CODE

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24.05.010 General.

The regulations of this chapter shall govern the installation of fuel gas piping in or in connection with a building or structure or within the property lines of premises, other than service pipe. In addition to any requirements imposed herein, Standards 54 and 58 of the 1992 National Fire Protection Association (NFPA) Standards are hereby adopted and incorporated herein by reference and shall be considered part of this code.

One printed copy of Standard 54 and Standard 58 of the NFPA has been filed in the Office of the City Clerk for use and examination of the public.

This ordinance shall be known and cited as the "Lincoln Gas Piping Systems Code" and will be referred to herein as "this code." (Ord. 16542 §1; January 24, 1994).

24.05.020 Definitions.

For the purposes of this chapter, certain terms, phrases, words and their derivatives shall be interpreted as set forth in this section; provided, however, that whenever the words "gas meters" appear, they shall be construed to also mean valves and devices required for the regulation of pressure and the measurement of natural gas being dispensed for a building, structure or premises.

ADMINISTRATIVE AUTHORITY shall mean the Director of Building and Safety or his authorized representative.

APPLIANCE FUEL CONNECTOR shall mean an assembly of listed semirigid or flexible tubing and fittings to carry fuel between a fuel piping outlet and a fuel burning appliance.

APPROVED, as to materials, equipment and method of construction, shall mean approval by the Administrative Authority as the result of investigation and tests by the Administrative Authority, or by reason of accepted principles or tests by national authorities, technical or scientific organizations.

FUEL GAS shall mean natural, manufactured, liquefied petroleum or a mixture of these.

GAS PIPING shall mean an installation of pipe, valves or fittings that is used to convey fuel gas, installed on a premises or in a building, but shall not include:

- (1) Portions of the service piping.
- (2) Approved appliance fuel connectors six feet or less in length between an existing gas outlet and a gas appliance in the same room with the outlet.

GAS PIPING SYSTEM shall mean an arrangement of gas piping supplied by a single meter or each arrangement of gas piping serving a building, structure or premises, whether individually metered or not.

HIGH-DISTRIBUTION PRESSURE or FIRST-STAGE PRESSURE shall mean pressure used in propane vapor systems not exceeding 10 psig.

LIQUEFIED PETROLEUM GAS FACILITIES shall mean tanks, containers, container valves, regulating equipment, meters and appurtenances for the storage and supply of liquefied petroleum gas for a building or premises.

MEDIUM PRESSURE shall mean pressure exceeding fourteen inches water column but not exceeding 5 psig.

PIPELINE WELDER shall mean a person qualified in welding pipes who holds a valid certificate of competency from an approved agency.

QUICK-DISCONNECT DEVICE shall mean a hand-operated device which provides a means for connecting and disconnecting an appliance or an appliance connector to a gas supply. The device is equipped with an automatic means to shut off the gas supply when the device is disconnected.

SECOND-STAGE PRESSURE shall mean pressure used in propane vapor systems of 14-inch water columns or less.

SERVICE PIPING shall mean the piping and equipment between the street gas main and the gas-piping system inlet which is installed by and is under the control and maintenance of the serving gas supplier. (Ord. 16542 §2; January 24, 1994).

24.05.030 Application for Permit.

Every person, firm, or corporation desiring to install, alter, or remove any portion of a gas piping system in any building or upon any premises shall on a form provided by the Administrative Authority make written application therefor to the Administrative Authority. Plans, engineering calculations, diagrams and other data shall be submitted in triplicate with each application for a permit. The Administrative Authority may require plans, computations and specifications to be prepared and designed by an engineer or architect licensed by the state to practice as such. However, the Administrative Authority may waive the submission of plans, calculations or other data if he finds that the nature of the work applied for is such that reviewing of plans is not necessary to obtain compliance with this code. Gas piping system permits shall only be issued to registered master gas fitters. (Ord. 16542 §3; January 24, 1994).

24.05.040 Plans and Specifications.

Upon the granting of a permit, the Administrative Authority shall retain one set of the approved plans and specifications of the proposed gas piping system. The Administrative Authority shall file such plans and specifications in his office. The applicant shall keep one set of approved plans and specifications at the site where the work is being done. (Ord. 16542 §4; January 24, 1994).

24.05.050 Workmanship.

Gas piping shall not be strained or bent nor shall appliances be supported by or develop strain or stress on supply piping. Gas piping supplying appliances designed to be supported by the piping may be used to support appliances. (Ord. 16542 §5; January 24, 1994).

24.05.060 Inspections.

(a) **General.** Upon completion of installation, alteration or repair of gas piping, and prior to the use thereof, the Administrative Authority shall be notified that gas piping is ready for inspection.

(b) **Accessibility for Inspection.** Excavations required for the installation of underground piping shall be kept open until such time as the piping has been inspected and approved. If piping is covered or concealed before approval, it shall be exposed upon the direction of the Administrative Authority.

(c) **Required Inspections.** The Administrative Authority shall make the following inspections and shall either approve that portion of the work as completed, or shall notify the permit holder wherein the same fails to comply with this chapter.

(1) **Rough piping inspection.** This inspection shall be made after gas piping authorized by the permit has been installed and before such piping has been covered or concealed or a fixture or appliance has been attached thereto. This inspection shall include a determination that the gas piping size, material and installation meet the requirements of this section.

(2) **Final piping inspection.** This inspection shall be made after piping authorized by the permit has been installed and after all portions thereof which are to be covered or concealed are so concealed and before fixtures, appliances or shutoff valves have been attached thereto. This inspection shall include an air, CO² or nitrogen pressure test, at which time the gas piping shall stand a pressure of not less than 10-pounds-per-square-inch gauge or not less than one and one-half times the operating pressure or, at the discretion of the Administrative Authority, the piping and valves may be tested at a pressure of at least six inches mercury, measured with a manometer or slope gauge. Test pressures shall be held for a length of time satisfactory to the Administrative Authority but not less than fifteen minutes, with no perceptible drop in pressure. For welded piping, and for piping carrying gas at pressures exceeding fourteen inches water column pressure, the test pressure shall be at least sixty pounds per square inch and shall be continued for a length of time satisfactory to the Administrative Authority but not less than thirty minutes. These tests shall be made using air, CO² or nitrogen pressure only and shall be made in the presence of the Administrative Authority. Necessary apparatus for conducting tests shall be furnished by the permit holder.

(d) **Other Inspections.** In cases where the work authorized by the permit consists of a minor installation of additional piping to piping already connected to a gas meter or supply tank, the foregoing inspections may be waived at the discretion of the Administrative Authority. The Administrative Authority shall make such inspection as he deems advisable in order to assure that the work has been performed in accordance with the intent of this chapter. (Ord. 16542 §6; January 24, 1994).

24.05.070 Certificate of Inspection.

If, upon final piping inspection, the installation is found to comply with the provisions of this chapter, a certificate of inspection may be issued by the Administrative Authority. (Ord. 16542 §7; January 24, 1994).

24.05.080 Authority to Render Gas Service.

It shall be unlawful for a person, firm or corporation, excepting an authorized agent or employee of a person, firm or corporation engaged in the business of furnishing or supplying gas and whose service pipes supply or connect with the particular premises, to turn on or reconnect gas service in or on a premises where and when gas service is, at the time, not being rendered.

It shall be unlawful to turn on or connect gas in or on a premises unless gas piping outlets are properly and securely connected to gas appliances or capped or plugged with threaded fittings. (Ord. 16542 §8; January 24, 1994).

24.05.090 Authority to Disconnect.

(a) **General.** The Administrative Authority or the serving gas supplier is authorized to disconnect any gas piping or appliance, or both, which is found not to conform to the requirements of this chapter or which is found defective and a danger to life or property.

(b) **Disconnection Notice.** A notice of disconnection shall be attached to defective piping and appliances stating why they have been disconnected.

(c) **Closing Outlets.** It shall be unlawful to remove or disconnect gas piping or a gas appliance without capping or plugging the outlet from which said pipe or appliance was removed with a threaded fitting. Outlets on a piping system which has been installed, altered or repaired to which gas appliances are not connected shall be left capped gastight.

EXCEPTION: When an approved listed quick-disconnect device is installed. (Ord. 16542 §9; January 24, 1994).

24.05.100 Temporary Use of Gas.

The Administrative Authority may allow temporary use of fuel gas from a gas-piping system conforming to the requirements of this chapter. The period of temporary use shall be established by the Administrative Authority. (Ord. 16542 §10; January 24, 1994).

24.05.110 Gas Meter Locations.

(a) **General.** Gas meter locations shall be approved by the Administrative Authority and the serving gas supplier.

(b) **Multiple Meters.** When more than one meter is set on a premises, they shall all be set at one location, except when this is impractical. In multiple meter installations, each gas-piping system shall be identified by the permittee in a manner satisfactory to the Administrative Authority and the serving gas supplier.

(c) **Main Shutoff.** Gas meters shall be preceded by a main supply shutoff valve and shall be so placed as to be readily accessible for inspection, reading, testing and shutting off the gas supply. Service piping and main supply shutoff valves shall be outside of the building and readily accessible.

(d) **Inlet Location.** The gas piping inlet shall be located adjacent to the approved meter location.

(e) **Meter Access.** Access to enclosed gas meters, except those located in an approved vault supplied by the serving gas supplier, shall be through an opening or door not less in size than 22 inches by 24 inches.

(f) **Meter Location.** Gas meters shall not be located under a show window or under interior stairways or in engine, boiler, heater or electric meter rooms. Where not prohibited by other regulations, gas meters may be located in the open under exterior stairways. (Ord. 16542 §11; January 24, 1994).

24.05.120 Material for Gas Piping.

Pipe used for the installation, extension, alteration or repair of gas piping shall be standard weight wrought iron or steel (galvanized or black), yellow brass containing not more than 75 percent copper, or internally tinned or equivalently treated copper of iron pipe size. Approved PE (polyethylene) pipe may be used in exterior buried piping systems when used with factory assembled steel risers.

EXCEPTION: Copper and brass tubing and fittings (except tin-lined copper tubing) shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 standard cubic feet of gas (0.7 milligrams per 100 liters).

Gas pipe shall be new or shall have been used previously for no purpose other than conveying gas; it shall be in good condition, clean and free from internal obstructions. Burred ends shall be reamed to the full bore of the pipe.

Fittings used in connection with the piping shall be of malleable iron, yellow brass containing not more than 75 percent copper or approved plastic fittings.

Valves and appurtenances for gas piping shall be of a type designed and approved for use with fuel gas and AGA approved and stamped. (Ord. 16542 §12; January 24, 1994).

24.05.130 Installation of Gas Piping.

(a) **Joints.** Joints in the piping system, unless welded, shall be threaded joints having approved standard threads or flared joints. Threaded joints shall be made with approved pipe joint material, insoluble in fuel gas and applied to the male threads only. Welded joints in a gas-supply system shall be made by a certified pipeline welder. See Section 24.05.020.

(b) **Location.** Gas piping shall not be installed in or on the ground under any building or structure and exposed gas piping shall be kept at least six inches above grade or structure.

Concealed unprotected gas piping may be installed above grade in approved recesses or channels.

EXCEPTION: When necessary due to structural conditions, approved type gas piping may be installed in other locations, when permission has first been obtained from the Administrative Authority.

(c) **Drip Pipes.** When water vapor is present in the fuel gas served, accessible drip pipes shall be provided at points where condensation will collect.

(d) **Corrosion and Covering Protection.** Ferrous gas piping installed under ground in exterior locations shall be protected from corrosion by approved coatings or wrapping materials applied in an approved manner. Horizontal metallic piping shall have at least twelve inches of earth cover or equivalent protection. Plastic gas piping shall have at least eighteen inches of earth cover or equivalent protection. Risers, including prefabricated risers inserted with plastic pipes, shall be metallic and shall be protected in an approved manner to a point at least six inches above grade. When a riser connects to plastic pipe underground the horizontal metallic portion underground shall be at least thirty inches in length before connecting to the plastic service pipe. An approved transition fitting or adaptor shall be used where the plastic joins the metallic riser.

Gas pipe protective coatings shall be approved types, machine applied conforming to recognized standards. Field wrapping shall provide equivalent protection and is restricted to those short sections and fittings necessarily stripped for threading or welding. Zinc coatings (galvanizing) shall not be deemed adequate protection for piping below ground. Ferrous metals exposed in exterior locations shall be protected from corrosion in a manner satisfactory to the Administrative Authority.

(e) **Corrosion Isolation.** Underground ferrous gas piping shall be electrically isolated from the rest of the gas system with listed or approved isolation fittings installed a minimum of six inches above grade.

(f) **Support and Fill.** Gas piping shall be adequately supported by metal straps or hooks at intervals not to exceed those intervals as set out in Table No. 1 at the end of this chapter. Gas piping installed below grade shall be effectively supported at all points on undisturbed or well-compacted soil or sand.

(g) **Building Shutoff.** Gas piping supplying more than one building on a premises shall be equipped with separate shutoff valves to each building, so arranged that the gas supply can be turned on or off to an individual or separate building. The shutoff valve shall be located outside the building it supplies and shall be readily accessible. Buildings accessory to single-family residences are exempt from the requirements of this subsection.

(h) **Unions.** Groundjoint unions may be used at exposed fixture, appliance, or equipment connections and in exposed exterior locations immediately on the discharge side of a building shutoff valve. Heavy-duty, flanged-type unions may be used. Bushings shall not be in concealed locations.

(i) **Interjections.** When air, oxygen or other special supplementary gas under pressure is introduced with the regularly supplied gas, either directly into the gas piping system or at burners, a device approved by the Administrative Authority shall be installed to prevent backflow of the supplemental gas into the gas-piping system. The device shall be located between the source of the supplemental gas and meter and shall be on the gas line leading to the appliance using the special gas. This device may be either a spring-loaded or diaphragm type check valve and shall be capable of withstanding the pressure imposed on it.

When liquefied petroleum or other standby gas is interconnected with the regular gas-piping system, an approved three-way two-port valve or other adequate safeguard acceptable to the Administrative Authority shall be installed to prevent backflow into either supply system.

(j) **Valves.** Valves used in connection with gas piping shall be approved types, AGA approved and stamped.

(k) **Barbecue or Fireplace Outlets.** Gas outlets in a barbecue or fireplace shall be controlled by an approved operating valve located in the same room and outside the fireplace but not more than four feet from the outlets. If piping on the discharge side of the control valve is standard weight brass, galvanized steel, or black iron pipe, the piping may be embedded in or surrounded by not less than two inches of concrete or masonry.

(l) **Shutoff Valve.** An accessible shutoff valve of a type set forth in Subsection (j) of this section shall be installed in the fuel-supply piping outside of each appliance and ahead of the union connection thereto, and in addition to any valve on the appliance. Shutoff valves shall be within three feet of the appliance.

Shutoff valves may be located immediately adjacent to and inside or under an appliance when placed in an accessible and protected location and when such appliance may be removed without removal of the valve.

Shutoff valves may be accessibly located inside wall heaters and wall furnaces listed for recessed installation where necessary maintenance can be performed without removal of the shutoff valve.

(m) **Tracer for Nonmetallic Buried Piping.** A No. 18 copper tracer wire or other approved conductor shall be installed with and attached to underground nonmetallic gas piping and shall terminate above grade at each end.

(n) **Directional Changes.** Changes in direction of gas piping shall be made by use of appropriate fittings, except that polyethylene gas piping and tubing may be bent to a radius not less than twenty times the nominal diameter of the pipe or tube. (Ord. 16542 §13; January 24, 1994).

24.05.140 Appliance Fuel Connectors.

Appliance connections shall have a diameter not less than that of the inlet connection to the appliance as provided by the manufacturer and each appliance shall be rigidly connected to the gas piping with materials as provided in Section 24.05.120.

EXCEPTION: A gas appliance may be connected with an approved listed metal appliance connector under the following conditions:

1. Listed metal appliance connectors shall have an overall length not to exceed three feet, except cooking ranges and laundry equipment connectors, which may not exceed six feet.
2. Connectors shall not be concealed within or extended through wall, floor or partition.
3. A listed appliance connector valve not less than the nominal size of the connector shall be accessible at the gas piping outlet immediately ahead of the connector.
4. Connectors shall be of adequate size to provide the total demand of the connected appliance based on Table No. 2 or 2A as set out at the end of this chapter as applicable.
5. Aluminum alloy connectors may be used only in interior locations where they shall not be in contact with masonry, plaster or insulation or are not subject to repeated corrosive wettings.
6. The connection of an indoor appliance with any type of gas hose is prohibited, except when used for laboratory or shop equipment or equipment that requires mobility during operation. Such connections shall have the shutoff or stopcock installed at the connection to the building piping. When gas hose is used, it shall be of the minimum practical length, but not to exceed six feet, except for hand torches and special mobile equipment, and shall not extend from one room to another nor pass through walls, partitions, ceilings or floors. Gas hose shall not be concealed from view or used in a concealed location. Only listed gas hose shall be used in accordance with its listing. Gas hose shall not be used where it is likely to be subject to temperatures exceeding 125°F., nor shall it be used as a substitute for a standard appliance connector.
7. Outdoor portable appliances may be connected with an approved outdoor hose connector not to exceed 15 feet in length, provided it connects outdoors to approved gas piping including an approved valve at the inlet of the hose connector.
8. Appliances may be connected to fuel-gas piping with an approved listed quick disconnect device. (Ord. 16542 §14; January 24, 1994).

24.05.150 Liquefied Petroleum Gas Facilities and Piping.

In addition to the requirements of this chapter for gas piping, the facilities and piping for use with liquefied petroleum gas shall meet the following requirements:

Liquefied petroleum gas facilities shall conform to approved standards. Liquefied petroleum gas facilities and their locations shall be approved by the Administrative Authority and shall conform to state and city fire-prevention regulations.

When liquefied petroleum gas facilities serve more than one customer through separate piping systems, each system shall be identified in a manner satisfactory to the Administrative Authority.

Liquefied petroleum gas facilities shall be so placed as to be readily accessible for inspection, reading, testing and shutting off the gas supply. Service piping and main supply shutoff valves shall be outside of the building. Main supply valves shall be of approved type and readily accessible.

Gas piping inlets shall be located with respect to the proposed liquefied petroleum gas facility location in accordance with the requirements of this section.

Liquefied petroleum gas facilities shall not be located in a pit or basement, under show windows or interior stairways, in engine, boiler, heater or electric meter rooms. When not prohibited by another regulation, approved liquefied petroleum gas metering devices may be located in the open under exterior stairways.

Pipejoint compounds used on threaded connections shall be insoluble in liquefied petroleum gas.

Valves and appurtenances used in liquefied petroleum gas systems shall be designed and approved for use with liquefied petroleum gas.

Discharge from relief valves shall be into open air and shall be at least five feet measured horizontally from an opening into a building which is below the discharge. (Ord. 16542 §15; January 24, 1994).

24.05.160 Leaks.

The leakage shall be located by means of an approved combustible gas detector, soap and water, or an equivalent nonflammable solution. Matches, candles, open flames, or other methods that could provide a source of ignition shall not be used. **CAUTION:** Since some leak test solutions, including soap and water, may cause corrosion or stress cracking, the piping shall be rinsed with water after testing, unless it has been determined the leak test solution is noncorrosive. Where leakage or other defects are located, the affected portion of the piping system shall be repaired or replaced and retested.

Flame or acid shall not be used to locate or repair leaks, nor shall sub-stances other than air be introduced into the gas piping.

Defective pipe or fitting shall be removed and replaced with approved material. (Ord. 16542 §16; January 24, 1994).

24.05.170 Interconnections of Gas Piping Systems.

It shall be unlawful to connect a gas appliance in such a manner that the appliance may receive gas from more than one system of gas piping.

The installation, use or maintenance of a gas valve which makes it possible to turn on, control or otherwise direct the flow of gas from one system of gas piping to another, where the systems are supplied with gas from separate meters, is prohibited, and valves or other interconnection between separate systems of gas piping shall be removed upon order of the Administrative Authority. (Ord. 16542 §17; January 24, 1994).

24.05.180 Required Gas Supply.

(a) **General.** Natural gas regulations and tables are based on the use of gas having a specific gravity of 0.60 supplied at six to eight inches water column pressure at the outlet of the meter. For undiluted liquefied petroleum gas, gas piping may be sized for 2500 Btu per cubic foot at eleven inches water column and specific gravity of 1.52.

Where gas of a different specific gravity is to be delivered, the serving gas supplier should be contacted for conversion factors or revised capacity tables to use in sizing piping systems.

(b) **Determining Volume.** The hourly volume of gas required at each piping outlet shall be taken as not less than the maximum hourly rating as specified by the manufacturer of the appliance or appliances to be connected to each such outlet.

When gas appliances to be installed have not been definitely specified, the minimum demands contained in Table No. 3 as set out at the end of this chapter may be used to estimate requirements of typical appliances.

To obtain the cubic feet per hour of gas required, divide Btu per hour input of appliances by the average Btu heating value per cubic foot of the gas. The average Btu per cubic foot of the gas in the area of the installation may be obtained from the serving gas supplier.

(c) **Minimum Size.** The size of the supply piping outlet for a gas appliance shall normally be at least 1/2 inch.

The minimum size piping outlet for a mobile home shall normally be 3/4 inch. (Ord. 16542 §18; January 24, 1994).

24.05.190 Required Gas Piping Size.

(a) **General.** When the maximum demand does not exceed 250 cubic feet per hour and the maximum length of piping between the meter and the most distant outlet does not exceed 250 feet, the size of each section and each outlet of any system of gas piping shall be determined by using Table No. 4 or 4A as set out at the end of this chapter as applicable.

Other systems within the range of Table No. 4 or 4A, as applicable, may be sized from those tables or by the methods set forth in Subsection (b) of this section.

To determine the size of each section of pipe in a system within the range of Table No. 4 or 4A, as applicable, proceed as follows:

(1) Measure the length of the pipe from the gas meter location to the most remote outlet on the system.

(2) In Table No. 4 or 4A, as applicable, select the column showing that distance, or the next longer distance, if the table does not give the exact length.

(3) Starting at the most remote outlet, find in the vertical column just selected, the gas demand for that outlet. If the exact figure of demand is not shown, choose the next larger figure below in the column.

(4) Opposite this demand figure, in the first column at the left in Table No. 4, will be found the correct size of pipe.

(5) Using this same vertical column, proceed in a similar manner for each section of pipe serving this outlet. For each section of pipe, determine the total gas demand supplied by that section. Where gas piping sections serve both heating and cooling equipment and the installation prevents both units

from operating simultaneously, only the larger of the two demand loads need be used in sizing these sections.

(6) Size each section of branch piping not previously sized by measuring the distance from the gas meter location to the most remote outlet in that branch and follow the procedures of steps (2), (3), (4) and (5) above. **(Note:** Size branch piping in the order of their distance from the meter location, beginning with the most distant outlet not previously sized.)

(b) **High Demands and Long Runs.** For conditions other than those covered by Subsection (a) of this section, such as longer runs or greater gas demands, the size of each gas-piping system shall be determined by standard engineering methods acceptable to the Administrative Authority and each system shall be so designed that the total pressure drop between the meter or other point of supply and any outlet when full demand is being supplied to all outlets will not exceed 0.5-inch water column pressure.

(c) **Other Systems.** When the gas pressure is higher than 14 inches or lower than six inches water column, or when diversity demand factors are used, the design, pipe, sizing, materials, location and use of such systems shall be approved by the Administrative Authority. Piping systems designed for pressures higher than the serving gas supplier's standard delivery pressure shall have prior verification from the gas supplier of the availability of the design pressure. Systems using undiluted liquefied petroleum gas may be sized using Table No. 5 set out at the end of this chapter for eleven inches water column and in accordance with the provisions of Subsections (a) and (b). (Ord. 16542 §19; January 24, 1994).

24.05.200 Medium- and High-pressure Gas Piping.

(a) **General.** Approval of the Administrative Authority and verification from the serving gas supplier of the availability of the desired pressure shall be obtained before any medium- or high-pressure gas-piping system is installed.

(b) **Applicability.** The following requirements shall apply to medium-pressure gas-piping systems.

(c) **Pressure Regulators.** Approved regulators shall be installed on medium- and high-pressure gas-piping systems, in approved locations, and shall be accessible for servicing. Each regulator shall have a separate vent to the outside.

EXCEPTION: Pounds-to-inches water-column regulators equipped with limiting orifices capable of releasing not more than five cubic feet of gas per hour when supplied with medium pressure need not be vented to an outside location when the regulators have been approved by the Administrative Authority. These regulators shall:

1. Be connected to the same piping material used to pipe the structure. A listed gas connector may be used to attach the low-pressure piping downstream of the regulator to the appliance manifold.
2. Have an approved gas valve in the supply line upstream of the pounds-to inches water-column regulator.
3. Be accessible.
4. Have the upstream pressure identified. Such identification shall be an approved tag permanently attached to the regulator and state: Warning 1/2 to 5 pounds natural gas pressure. DO NOT REMOVE.
5. Be installed in a ventilated area.

An approved gas valve shall be installed immediately preceding each regulator. Regulators that may be subjected to mechanical damage shall be substantially protected to the satisfaction of the Administrative Authority.

(d) **Three or 5 psig.** Tables Nos. 6 and 7 set out at the end of this chapter may be used to size a natural gas piping system carrying 3 or 5 psig gas. The procedure to determine the size of each section of the system is similar to that contained in Section 24.05.190 using the pipe length from the meter to the most remote regulator on the medium- pressure system and sizing the downstream low-pressure piping from Table No. 4 or 4A as applicable.

(e) **Ten psig.** Table No. 8 set out at the end of this chapter may be used to size undiluted liquefied petroleum gas-piping systems carrying 10 psig gas. The procedure to determine the size of each section of the system is similar to Section 24.05.190 using the pipe length from the first stage or tank regulator to the most remote regulator in the second-stage system. Low-pressure piping shall be sized from Table No. 5A or 5B, as set out at the end of this chapter, as applicable.

(f) **Corrosion and Cover Protection.** Buried medium pressure gas piping shall be protected from corrosion as required by Section 24.05.130 and shall have a minimum earth cover of eighteen inches. Piping shall be covered with at least six inches of hand-placed selected backfill devoid of rocks, building materials or other matter that may damage the pipe or wrapping. (Ord. 16542 §20; January 24, 1994).

24.05.210 Fuel-gas Equipment and Installations in Mobile-home Parks.

(a) **General.** Except as otherwise permitted or required by this section, fuel-gas equipment and installations in mobile home parks shall comply with the provisions of this chapter. The provisions of this section do not apply to the mobile home gas piping and equipment.

(b) **Required Gas Supply.** The minimum hourly volume of gas required at each mobile home lot outlet or any section of the mobile home park gas-piping system shall be calculated as set out in Table No. 9 at the end of this chapter.

Required gas supply for buildings or other fuel-gas-consuming appliances connected to the mobile home park gas-piping system shall be calculated as provided in this chapter.

(c) **Installation.** Gas piping installed below ground shall have a minimum earth cover of eighteen inches.

Gas piping shall not be installed aboveground under a mobile home.

(d) **Location.** Gas piping shall not be installed underground beneath buildings or that portion of the mobile home lots reserved for the location of mobile homes, mobile home accessory buildings or structures, concrete slabs or automobile parking, unless installed in a gastight conduit.

The conduit shall be pipe approved for installation underground beneath buildings and not less than Schedule 40 pipe. The interior diameter of the conduit shall be at least 1/2 inch larger than the outside diameter of the gas piping.

The conduit shall extend to a point at least twelve inches beyond any area where it is required, or the outside wall of a building, and the outer ends shall not be sealed. When the conduit terminates within a building, it shall be readily accessible and the space between the conduit and the gas piping shall be sealed to prevent leakage of gas into the building.

A gas piping lateral terminating in a mobile home lot outlet riser surrounded by a concrete slab shall not be required to be installed in a conduit provided the concrete slab is entirely outside the wall line of the

mobile home, is not continuous with any other concrete slab and is used for stabilizing other utility connections.

(e) **System Shutoff Valve.** A readily accessible and identified shutoff valve controlling the flow of gas to the entire gas-piping system shall be installed near the point of connection to the service piping or supply connection of the liquefied petroleum gas tank.

(f) **Mobile Home Lot Shutoff Valve.** Each mobile home lot shall have an approved gas shutoff valve installed upstream of the mobile home lot gas outlet and located on the outlet riser at a height at least four inches above grade. Such valve shall not be located under a mobile home. When the mobile home lot outlet is not in use, the outlet shall be equipped with an approved cap or plug to prevent accidental discharge of gas.

(g) **Mobile Home Lot Gas Outlet.** Each mobile home lot piped for gas shall be provided with an individual outlet riser at the mobile home lot.

The mobile home lot gas outlet shall terminate with the service connection located within a four-foot area in the rear third section of the mobile home lot on the left (road) side of the mobile home, with respect to the location, or proposed location, of the mobile home on the lot.

(h) **Mobile Home Connector.** Each mobile home shall be connected to the mobile home lot outlet by an approved mobile home connector, a maximum of six feet in length. Approved pipe and fittings may be used between the flexible connector and the mobile home lot gas outlet when the distance between the mobile home lot gas outlet and the mobile home gas service connection exceeds that required to make a safe installation with only a mobile home connector. Gas connectors shall be of a size to adequately supply the total demand of the connected mobile home.

(i) **Mechanical Protection.** Gas outlet risers, regulators, meters, valves or other exposed equipment shall be protected from mechanical damage by vehicles or other causes. Such protection may consist of posts, fencing or other permanent barriers.

Atmospherically controlled regulators shall be installed in a manner that moisture cannot enter the regulator vent and accumulate above the diaphragm. When the regulator vent may be obstructed by snow or ice, shields, hoods or other suitable devices shall be provided to guard against obstruction of the vent opening.

(j) **Gas Meters.** Meters shall be installed in ventilated or accessible locations not closer than three feet to sources of ignition.

When meters are installed, they shall not depend on the gas outlet riser for support, but shall be adequately supported by a post or bracket placed on a firm footing, or other approved means providing equivalent support.

(k) **Gas Piping Size.** The size of each section of natural gas or LP-gas piping systems shall be determined as specified in this chapter.

(l) **Maintenance.** The operator of the mobile home park shall be responsible for maintaining gas piping installations and equipment in a safe working condition. (Ord. 16542 §21; January 24, 1994).

24.05.220 Registration Required.

Except as hereinafter provided, no person shall install, alter, modify, or repair a gas piping system, or engage in contracting for such work without first having been registered as a master plumber under the provisions of Chapter 24.10, as a heating, ventilating, and cooling contractor under the provisions of Chapter 25.01 or as a master gas fitter under the provisions of this chapter; provided, however, the

employees of a master gas fitter performing work for such master gas fitter pursuant to and within the scope of work permitted by the following registration shall be deemed in compliance with this section.

(a) Registration as a journeyman plumber under Chapter 24.10 or registration under this chapter as a journeyman gas fitter entitles the journeyman to install, alter, or repair a gas piping system.

(b) Registration as an apprentice plumber under Chapter 24.10 or registration under this chapter as an apprentice gas fitter entitles the apprentice to assist in the installation, repair, or alteration of a gas piping system under the direct supervision and in the immediate presence of the master or journeyman plumber or the master or journeyman gas fitter. (Ord. 16851 §1; August 14, 1995; prior Ord. 16542 §22; January 24, 1994).

24.05.230 Application.

Application for registration shall be made in writing in the office of the Administrative Authority upon blanks furnished by said authority, which shall show the name and residence of the applicant, the business location of the applicant, and such other information as required by the Administrative Authority to prove the competence of the applicant. (Ord. 16542 §23; January 24, 1994).

24.05.240 Examining Board.

There is hereby created an examining board to examine the qualifications of applicants desiring to be registered as a master or journeyman gas fitter. Such examining board shall consist of the Chief Plumbing Inspector of the city, two master gas fitters, a natural gas supplier, a propane gas industry representative, and a registered mechanical engineer. The two master gas fitters, the natural gas supplier, the propane gas supplier, and the registered mechanical engineer shall be appointed by the Mayor with City Council approval to serve on the examining board for a term of three years and shall serve without pay. The Chief Plumbing Inspector shall be the permanent secretary of the examining board and shall keep a record of all meetings. (Ord. 16542 §24; January 24, 1994).

24.05.250 Examining Board; Authority.

Unless authority is specifically delegated to other boards provided by this code, the examining board shall, subject to the approval of the Mayor, adopt rules and regulations consistent with the provisions of this code for the examination of applicants for registration under the provisions of this code. All decisions of the examining board shall be subject to review by the Mayor upon written request of the aggrieved party. The examining board shall determine minimum qualifications for applicants for registration based upon a point system as part of the rules and regulations and shall determine the nature of the examination to be given applicants for registration. (Ord. 16542 §25; January 24, 1994).

24.05.260 Examination Required.

Before the applicant shall be registered as a master or journeyman gas fitter, he shall pay an examination fee and submit to an examination to determine his fitness and competency to be registered as a master or journeyman gas fitter, which examination shall be given by the examining board.

The examination for master or journeyman gas fitter will be given on the second Thursday of February, May, August, and November of each year. The application, on forms furnished by the Administrative Authority, along with the examination fee, shall be submitted at least two weeks prior to each examination. Upon the payment of the required registration fee, the applicant, after having by said

examination shown himself to the satisfaction of the examining board to be fit and competent to be registered as a master or journeyman gas fitter, as the case may be, shall be so registered by the Administrative Authority, who shall deliver to said applicant the respective certificate of registration signed by said Authority. Any applicant who fails to pass the required examination shall not be eligible to take the examination until six months have elapsed.

Notwithstanding the above, any person who, prior to the operative date of this ordinance, has been engaged in the occupation of a master gas fitter or journeyman gas fitter shall be granted a registration at his level of qualification as determined by the examining board, without examination, upon payment of the required fee. An applicant for such registration shall submit a written application to the examining board and such evidence as the board may require showing that the applicant is qualified to undertake and safely and properly perform work as a master gas fitter or journeyman gas fitter. All such applications shall be made to the board within ninety days after the operative date of this ordinance. (Ord. 16542 §26; January 24, 1994).

24.05.270 Examining Board; Meetings.

The examining board shall meet when deemed necessary at the call of the chairman. (Ord. 16542 §27; January 24, 1994).

24.05.280 Registration of Corporations, Firms, or Partnerships.

Any corporation, firm, or partnership may be registered hereunder as a master gas fitter in the name of such corporation, firm, or partnership; provided, that such corporation, firm, or partnership shall have a master gas fitter who has submitted to the examination given by the examining board and has thereby shown himself fit, competent, and qualified to be registered as a master gas fitter as a bona fide officer or manager of such corporation or a member of such firm or partnership, and who shall at all times be in actual charge of and be responsible for the installation or repair of any and all gas piping system work done by such corporation, firm, or partnership. Before a corporation, firm, or partnership shall be registered in its corporate, firm, or partnership name as a master gas fitter, there shall be filed with the Administrative Authority a certificate from the examining board showing the fitness and competency of such officer or manager of such corporation or such member of such firm or partnership to be a master gas fitter; provided, further, that if after a certificate of registration is issued to such corporation, firm, or partnership, the master gas fitter, as an officer or manager of the corporation or a member of the firm or partnership, shall withdraw therefrom and cease to be connected therewith, then and in that event the Administrative Authority shall forthwith revoke the certificate of registration of such corporation, firm, or partnership. A master gas fitter working for and covered by the insurance of a corporation, firm, or partnership registered under this section is not required to duplicate such coverage under his own insurance policy. (Ord. 16542 §28; January 24, 1994).

24.05.290 Expiration of Registration.

All registrations shall expire on the thirty-first day of May following the date thereof, and shall not be assignable. (Ord. 16542 §29; January 24, 1994).

24.05.300 Suspension or Revocation of Certificate of Registration.

The Mayor, after hearing as hereinafter specified and upon the recommendations of the Administrative Authority and a report from the examining board, shall have the power to suspend or revoke any master or journeyman gas fitter's certificate of registration if the same was obtained by error or fraud, or if the holder thereof is shown to be no longer qualified, or if such holder fails, neglects, or refuses to comply with the provisions of this code.

If suspension or revocation of a certificate of registration is recommended as above provided, the Mayor shall cause written notice to be served upon the registered master or journeyman gas fitter whose registration is recommended for suspension or revocation, setting forth a time and place for a public hearing. Upon the conclusion of such hearing, the Mayor shall within thirty days thereafter render a written decision to such registered master or journeyman gas fitter regarding suspension or revocation of his registration. Such written decision shall be served by mailing it to such registered master or journeyman gas fitter by certified mail at his last known business address or by personal service. If a certificate of registration is revoked, the holder of the same shall not apply for registration until one year after the date of such revocation. (Ord. 16542 §30; January 24, 1994).

24.05.310 Renewal of Certificate of Registration.

Certificates of registration at the time of their expiration may be renewed upon recommendation of the examining board and upon payment of the required annual registration fee. (Ord. 16542 §31; January 24, 1994).

24.05.320 Lapsed Registration.

Any person registered under the provisions of this chapter as a master or journeyman gas fitter who does not renew his certificate of registration for a period of sixty days after the expiration of the same shall pay the examination fee required by this chapter for a master or journeyman gas fitter, as the case may be, and shall submit himself to the gas fitter's examination by the examining board before such person can again be registered hereunder. (Ord. 16542 §32; January 24, 1994).

24.05.330 Apprentice; Registration.

No person shall engage in any gas piping system work as an apprentice gas fitter unless he has registered with the examining board as a master or journeyman gas fitter's apprentice upon forms prescribed by the Administrative Authority. No registered master or journeyman gas fitter shall employ any person as an apprentice gas fitter who is not so registered. No apprentice gas fitter shall be permitted to work at the installation, alteration, or repair of any gas piping system except under the personal supervision and direction and in the presence of a registered master or journeyman gas fitter. All apprentice gas fitters, after having served two years at such trade, or having equivalent training, may apply for registration as a journeyman gas fitter hereunder and take the required examination. (Ord. 16542 §33; January 24, 1994).

24.05.340 Registered Master or Journeyman Gas Fitter Not to Permit Another Person to Work on his Certification.

No registered master or journeyman gas fitter shall allow his name to be used by another person, directly or indirectly, either to obtain a permit for the installation, repair, or alteration of any gas piping

system as hereinafter required, or to do any gas piping system work; and if any registered master or journeyman gas fitter violates this provision, the Administrative Authority shall forthwith recommend revocation of the certificate of registration issued to such person. In addition to having this certificate of registration revoked, such master or journeyman gas fitter may be prosecuted under the penalty section of this chapter for such violation. (Ord. 16542 §34; January 24, 1994).

24.05.350 Registration and Examination Fee.

Each applicant for master gas fitter registration or journeyman gas fitter registration shall pay to the Administrative Authority an examination fee as follows:

Master gas fitter's examination fee	\$30.00
Journeyman gas fitter's examination fee	\$30.00

Upon initial issuance or subsequent renewal of a registration certificate, a registration fee shall be paid annually to the Administrative Authority as follows:

Master gas fitter - annual registration fee	\$50.00
Journeyman gas fitter - annual registration fee	\$10.00
Apprentice gas fitter - annual registration fee	\$ 5.00

Any person dealing in gas piping system materials or supplies, but not engaged in the installation, alteration, repair, or removal of gas piping system shall not be required to register hereunder.

Such fees shall be paid to the Department of Building and Safety. No fee shall be refunded. (Ord. 16542 §35; January 24, 1994).

24.05.360 Certificate of Insurance.

Before any master gas fitter as herein defined may be issued a permit under the provisions of this code, such master gas fitter shall be required to:

(a) At all times maintain public liability insurance coverage for all claims arising out of all work in the City of Lincoln and within three miles of the corporate limits thereof done by or under the supervision of the master gas fitter under the provisions of this code. Such insurance shall be in the form of a commercial or comprehensive general liability policy, or an acceptable substitute policy form as permitted by the City Attorney, with a minimum combined single limit of \$500,000.00 aggregate for any one occurrence on any job for which a permit is required under this code, provided the City of Lincoln shall be named an additional insured thereunder. The coverages required herein shall be subject to review and approval by the City Attorney for conformance with the provisions of this section.

(b) At all times keep on file with the Administrative Authority a current certificate of insurance signed by a qualified agent of an insurance company licensed to do business in the State of Nebraska and approved by the City Attorney for conformance with the provisions of this section evidencing the existence of valid and effective policies of insurance naming the city as an additional insured for the coverage required by subsection (a) of this section, the limits of each policy, the policy number, the name of the insurer, the effective date and expiration date of each policy, the deductibles or self-insurance retainers of each policy, and a copy of an endorsement placed on each policy requiring thirty days notice by mail to the

Administrative Authority before the insurer may cancel the policy for any reason, and upon request of the Administrative Authority or the City Attorney, a copy of any endorsements placed on such policies or the declarations page of such policies.

Expiration or cancellation of any insurance coverage required by this section shall constitute an automatic and immediate termination of the master gas fitter's privilege to be issued permits under the provisions of this code, unless other insurance meeting the requirements of this section is provided and in full force and effect at the time of such expiration or cancellation. (Ord. 16542 §36; January 24, 1994).

24.05.370 Payment Bond.

Before any master gas fitter may be issued a permit to make excavations in the public ways of the city, such master gas fitter shall deposit with the Administrative Authority a \$5,000.00 payment bond. Said bond shall provide that the master gas fitter shall pay to the city the cost of refilling such excavation and replacing the surface thereof. Failure to keep charges for excavation backfill and resurfacing in accordance with Public Works and Utilities Department policy shall be grounds for withholding further permits of any kind until such backlog of charges are paid in full. (Ord. 16951 §149; March 11, 1996; prior Ord. 16542 §37; January 24, 1994).

24.05.380 Permit Fee.

The following shall be the permit fees charged in this chapter:

New construction (1-5 outlets)	\$25.00
Each additional outlet	1.00
Replacement with another permit (heating or plumbing)	5.00
Replacement alone (with no other permit)	15.00
Gas piping alteration	15.00

(Ord. 16542 §38; January 24, 1994).

24.05.390 Penalty for Violations.

(a) Any person, firm or corporation violating any of the provisions of this code shall be deemed guilty of a misdemeanor, and each such person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any violation of any of the provisions of this code is committed, continued, or permitted; and upon conviction of any such violation, such person shall be punishable by a fine in any sum not to exceed \$500.00, or be imprisoned in the county jail for a period not to exceed six months, or both; except that each person so convicted shall be fined in a sum of not less than \$200.00 for the first offense, not less than \$250.00 for a second offense, and not less than \$300.00 for the third offense and each offense thereafter. (Ord. 16542 §39; January 24, 1994).

TABLE NO. 1—SUPPORT OF PIPING

Steel Pipe, Nominal Size of Pipe (Inches)	Spacing of Supports (Feet)	Nominal Size of Tubing (Inch O.D.)	Spacing of Supports (Feet)
$\frac{1}{2}$	6	$\frac{1}{2}$	4
$\frac{3}{4}$ or 1	8	$\frac{1}{2}$ or $\frac{3}{4}$	6
$1\frac{1}{4}$ or larger (horizontal)	10	$\frac{1}{2}$ or 1	8
$1\frac{1}{4}$ or larger (vertical)	every floor level		

For SI units: 1 foot = 0.305 m

**TABLE NO. 2—
CAPACITIES OF LISTED METAL APPLIANCE CONNECTORS¹**
For use with gas pressure 8-inch or more water column

SEMI-RIGID CONNECTOR O.D. ² (Inch)	FLEXIBLE CONNECTOR NOMINAL I.D. ³ (Inch)	MAXIMUM CAPACITIES IN THOUSANDS Btu/h (Based on pressure drop of 0.4-inch water column) Natural Gas ⁴ of 1100 Btu/cu. ft.							
		All Gas Appliances					Ranges and Domestic Clothes Dryers Only		
		1-foot	1½ foot	2-foot	2½ foot	3-foot	4-foot	5-foot	6-foot
d	$\frac{1}{4}$	40	33	29	27	25			
$\frac{1}{2}$	d	93	76	66	62	58			
e	$\frac{1}{2}$	189	155	134	125	116	101	90	80
	$\frac{3}{4}$	404	330	287	226	244			
	1	803	661	573	534	500			

¹Gas connectors are certified by the testing agency as complete assemblies including fittings and valves. Capacities shown are based on the use of fittings and valves supplied with the connector.

²Outside diameter.

³Internal diameter.

⁴For liquified petroleum gas use 1.6 times the natural gas capacities shown.

**TABLE NO. 2A—
CAPACITIES OF LISTED METAL APPLIANCE CONNECTORS¹
For use with gas pressure less than 8-inch water column**

SEMI-RIGID CONNECTOR O.D. ² (Inch)	FLEXIBLE CONNECTOR NOMINAL I.D. ³ (Inch)	CAPACITIES FOR VARIOUS LENGTHS IN THOUSANDS Btu/h (Based on pressure drop of 0.2-inch water column) Natural Gas ⁴ of 1100 Btu/cu. ft.							
		All Gas Appliances					Ranges and Domestic Clothes Dryers Only		
		1-foot	1½ foot	2-foot	2½ foot	3-foot	4-foot	5-foot	6-foot
d	¼	28	23	20	19	17			
½	d	66	54	47	44	41			
e	½	134	110	95	88	82	72	63	57
	¾	285	233	202	188	174			
	1	567	467	405	378	353			

¹Gas connectors are certified by the testing agency as complete assemblies including fittings and valves. Capacities shown are based on the use of fittings and valves supplied with the connector.

²Outside diameter.

³Internal diameter.

⁴For liquified petroleum gas use 1.6 times the natural gas capacities shown.

**TABLE NO. 3—MINIMUM DEMAND OF TYPICAL GAS APPLIANCES
Btu/h**

APPLIANCE	DEMAND
S))Q	
Domestic gas range	65,000
Domestic recessed top burner section	40,000
Domestic recessed oven section	25,000
Storage water heater—up to 30-gal. tank	30,000
Storage water heater—40 to 50-gal. tank	50,000
Domestic clothes dryer	35,000
Fireplace log lighter (residential)	25,000
Fireplace log lighter (commercial)	50,000
Barbecue (residential)	50,000
Gas refrigerator	3,000
Bunson burner	3,000
Mobile homes	¹
Gas engines (per horsepower)	10,000

TABLE NO. 4—SIZE OF GAS PIPING
Maximum Delivery Capacity in Cubic Feet of Gas Per Hour of I.P.S. Pipe Carrying Natural Gas of 0.60 Specific Gravity

Based on 0.5-inch Water Column Pressure Drop

Length in Ft.	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
5	62	145	280	475	750	1080	2200	3450	7000	11200	20000	42000
10	42	96	187	320	500	760	1550	2450	4950	8000	14200	29500
15	33	76	148	252	395	620	1300	2000	4000	6500	11500	24000
20	28	66	126	215	335	520	1100	1700	3450	5600	10000	21000
30	22	52	100	170	265	440	900	1400	2850	4600	8300	17000
40	19	44	84	145	225	380	795	1200	2500	4000	7200	14500
50	16	39	74	129	200	345	700	1100	2200	3550	6350	13000
60	15	35	67	115	180	315	640	1000	2000	3250	5800	12000
70	14	32	61	105	165	290	600	920	1850	3000	5400	11000
80	13	30	57	97	153	270	560	860	1750	2800	5050	10400
90	12	28	53	91	142	255	520	810	1650	2650	4750	9700
100	11	26	50	86	134	240	500	770	1580	2500	4500	9300
125	10	23	44	76	118	215	450	690	1400	2250	4000	8400
150	9	21	39	68	106	195	410	620	1290	2050	3650	7600
175	8	19	36	62	97	180	380	580	1190	1900	3400	7000
200	7	18	34	58	90	170	355	540	1100	1780	3200	6600
250	6	16	30	51	79	150	315	490	980	1600	2850	5900
300	6	14	26	45	71	140	285	445	900	1460	2600	5400
O.D. Tubing Size	3/8	1/2	5/8	3/4	7/8	1 1/8	1 3/8	1 5/8	2 1/8	2 5/8	3 1/8	4 1/8

Chart 2:
For 6-inch Water
Column
Pressure Pipe

Cth at 1-inch
Pressure Drop—
.65 Gravity Gas—
Nominal Pipe or
I.D. Tubing Size

Use this chart when metering or reduced pressure is 6 inches water column.

TABLE 4A—SIZE OF GAS PIPING

**Chart 3:
For Two-
Pound
Pressure Pipe**

**Cfh at 1½
Pounds
Pressure
Drop— .65
Gravity Gas—
Nominal Pipe
or I.D. Tubing
Size**

Length in Ft.	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
5	540	1260	2400	4150	6500	10500	21000	31000	58000	90000	150M	310M
10	360	850	1630	2780	4350	7600	15000	22000	41000	64000	110M	220M
15	285	670	1280	2150	3450	6200	12000	18000	34000	52000	90000	180M
20	240	570	1080	1860	2950	5400	10500	15000	29000	45000	79000	150M
30	192	450	860	1480	2300	4400	8600	13000	24000	36000	63000	125M
40	163	380	760	1250	2000	3800	7500	11000	20000	32000	55000	110M
50	143	335	645	1100	1750	3350	6700	9800	18000	28000	49000	97000
60	130	300	580	1000	1560	3050	6100	9000	17000	26000	45000	90000
70	118	275	530	910	1430	2800	5600	8200	15000	24000	41000	82000
80	110	255	490	850	1330	2650	5200	7700	14000	22000	38000	77000
90	102	240	460	790	1230	2500	4900	7200	13500	21000	36000	72000
100	96	225	430	740	1160	2350	4700	6800	12500	20000	34500	70000
125	85	198	380	650	1025	2100	4150	6100	11300	18000	31000	62000
150	76	178	340	585	920	1900	3800	5600	10400	16000	28000	56000
175	69	164	315	540	845	1800	3550	5200	9700	15500	26000	53000
200	64	146	290	500	780	1700	3300	4900	9000	14000	24000	49000
250	58	140	255	440	690	1500	2950	4300	8100	12500	22000	44000
300	51	120	230	395	620	1350	2700	4000	7400	11500	19000	40000
O.D. Tubing Size	3/8	1/2	5/8	3/4	7/8	1 1/8	1 3/8	1 5/8	2 1/8	2 5/8	3 1/8	4 1/8

Use this chart when metering or reduced pressure is 2 PSIG. Minimum inlet pressure to pounds-to-inches regulator will be 1/2 pound or 14 inches.

**TABLE NO. 5—MAXIMUM CAPACITY OF PIPE IN THOUSANDS OF Btu/h
OF UNDILUTED LIQUEFIED PETROLEUM GASES
For Distribution Pressure of 11-Inch Water Column, Pressure Drop of 0.5-Inch Water Column**

NOMINAL IRON PIPE SIZE (In Inches)	LENGTH OF PIPE, FEET												
	10	20	30	40	50	60	70	80	90	100	125	150	200
½	275	189	152	129	114	103	96	89	83	78	69	63	55
¾	567	393	315	267	237	217	196	185	173	162	146	132	112
1	1071	732	590	504	448	409	378	346	322	307	275	252	213
1¼	2205	1496	1212	1039	913	834	771	724	677	630	567	511	440
1½	3307	2299	1858	1559	1417	1275	1181	1086	1023	976	866	787	675
2	6221	4331	3465	2992	2646	2394	2205	2047	1921	1811	1606	1496	1260

TABLE NO. 5A— COPPER TUBE SIZING
Sizing Between First Stage (High Pressure Regulator) and
Second Stage (Low Pressure Regulator)

Maximum undiluted propane capacities listed are based on a 10 psig
first stage setting and 1 psig drop.

Capacities in 1,000 Btu/hr

Tubing Length Feet	Outside Diameter Copper tubing, Type L				
	d " 0.315	½" 0.430	e " 0.545	¾" 0.666	f " 0.785
30	309	700	1303	2205	3394
40	265	599	1115	1887	2904
50	235	531	988	1672	2574
60	213	481	896	1515	2332
70	196	443	824	1394	2146
80	182	412	767	1297	1996
90	171	386	719	1217	1873
100	161	365	679	1149	1769
150	130	293	546	923	1421
200	111	251	467	790	1216
250	90	222	414	700	1078
300	89	201	375	634	976
350	82	185	345	584	898
400	76	172	321	543	836
450	71	162	301	509	784
500	68	153	284	481	741
600	61	138	258	436	671
700	56	127	237	401	617
800	52	118	221	373	574
900	49	111	207	350	539
1000	46	105	195	331	509
1500	37	84	157	266	409
2000	32	72	134	227	350

TABLE NO. 5B— COPPER TUBE SIZING
Sizing Between Single or Second Stage
(Low Pressure Regulator) and Appliance

Maximum undiluted propane capacities listed are based
11" W.C. setting and a 0.5' W.C. pressure drop.

Capacities in 1,000 Btu/hr

Tubing Length Feet	Outside Diameter Copper tubing, Type L				
	d " 0.315	½" 0.430	e " 0.545	¾" 0.666	f " 0.785
10	49	110	206	348	536
20	34	76	141	239	368
30	27	61	114	192	296
40	23	52	97	164	253
50	20	46	86	146	224
60	19	42	78	132	203
80	16	36	67	113	174
100	14	32	59	100	154
125	12	28	52	89	137
150	11	26	48	80	124
200	10	22	41	69	106
250	9	19	36	61	94
300	8	18	33	55	85
350	7	16	30	51	78
400	7	15	28	47	73

TABLE NO. 6—MEDIUM-PRESSURE NATURAL GAS SYSTEM
For Sizing Gas Piping Carrying Gas of 0.60 Specific Gravity Capacity of Pipes of Different Diameters and
Lengths in Cubic Feet per Hour for Gas Pressure of 3.0 psi with a Drop to 1.5 psi

PIPE SIZE (In inches)												
	50'	100'	150'	200'	250'	300'	350'	400'	450'	500'	550'	600'
½	857	589	473	405	359	325	299	278	261	247	234	224
¾	1,793	1,232	990	847	751	680	626	582	546	516	490	467
1	3,377	2,321	864	1,595	1,414	1,281	1,179	1,096	1,029	972	923	881
1¼	6,934	4,766	3,827	3,275	2,903	2,630	2,420	2,251	2,112	1,995	1,895	1,808
1½	10,389	7,140	5,734	4,908	4,349	3,941	3,626	3,373	3,165	2,989	2,839	2,709
2	20,008	13,752	11,043	9,451	8,377	7,590	6,983	6,496	6,095	5,757	5,468	5,216
2½	31,890	21,918	17,601	15,064	13,351	12,097	11,129	10,353	9,714	9,176	8,715	8,314
3	56,376	38,747	31,115	26,631	23,602	21,385	19,674	18,303	17,173	16,222	15,406	14,698
	650'	700'	750'	800'	850'	900'	950'	1000'	1100'	1200'	1300'	1400'
½	214	206	198	191	185	180	174	170	161	154	147	141
¾	448	430	414	400	387	375	365	355	337	321	308	296
1	843	810	780	754	729	707	687	668	634	605	580	557
1¼	1,731	1,663	1,602	1,547	1,497	1,452	1,410	1,371	1,302	1,242	1,190	1,143
1½	2,594	2,492	2,401	2,318	2,243	2,175	2,112	2,055	1,951	1,862	1,783	1,713
2	4,995	4,799	4,623	4,465	4,321	4,189	4,068	3,957	3,758	3,585	3,433	3,298
2½	7,962	7,649	7,369	7,116	6,886	6,677	6,484	6,307	5,990	5,714	5,472	5,257
3	14,075	13,522	13,027	12,580	12,174	11,803	11,463	11,149	10,589	10,102	9,674	9,294
4	28,709	27,581	26,570	25,658	24,831	24,074	23,380	22,741	21,598	20,605	19,731	18,956
	1500'	1600'	1700'	1800'	1900'	2000'	2100'	2200'	2300'	2400'	2500'	2600'
½	136	131	127	123	120	117	114	111	108	106	103	101
¾	285	275	266	258	251	244	237	231	226	221	216	211
1	536	518	501	486	472	459	447	436	426	416	407	398
1¼	1,101	1,063	1,029	998	969	942	918	895	874	854	835	818
1½	1,650	1,593	1,542	1,495	1,452	1,412	1,375	1,341	1,309	1,279	1,252	1,225
2	3,178	3,069	2,970	2,879	2,796	2,720	2,649	2,583	2,522	2,464	2,410	2,360
2½	5,064	4,891	4,733	4,589	4,457	4,336	4,222	4,117	4,019	3,927	3,842	3,761
3	8,953	8,646	8,367	8,112	7,878	7,663	7,463	7,278	7,105	6,943	6,791	6,649
4	18,262	17,635	17,066	16,546	16,069	15,629	15,222	14,844	14,491	14,161	13,852	13,561
5	33,038	31,904	30,875	29,935	29,072	28,276	27,539	26,855	26,217	25,620	25,060	24,534
6	53,496	51,660	49,993	48,471	47,074	45,785	44,593	43,484	42,451	41,485	40,579	39,727

TABLE NO. 7—MEDIUM-PRESSURE NATURAL GAS SYSTEM
For Sizing Gas Piping Carrying Gas of 0.60 Specific Gravity Capacity of Pipes of Different Diameters and
Lengths in Cubic Feet per Hour for Gas Pressure of 5.0 psi with a Drop to 1.5 psi

PIPE SIZE (In inches)	LENGTH OF PIPE (In Feet)											
	50'	100'	150'	200'	250'	300'	350'	400'	450'	500'	550'	600'
½	1,399	961	772	661	586	531	488	454	426	402	382	365
¾	2,925	2,010	1,614	1,381	1,224	1,109	1,021	949	891	842	799	762
1	5,509	3,786	3,041	2,602	2,306	2,090	1,923	1,789	1,678	1,585	1,506	1,436
1¼	11,311	7,774	6,243	5,343	4,735	4,291	3,947	3,672	3,445	3,255	3,091	2,949
1½	16,947	11,648	9,353	8,005	7,095	6,429	4,914	5,502	5,162	4,876	4,631	4,418
2	32,638	22,432	18,014	15,417	13,664	12,381	11,390	10,596	9,942	9,391	8,919	8,509
2½	52,020	35,753	28,711	24,573	21,779	19,733	18,154	16,889	15,846	14,968	14,216	13,562
3	91,962	63,205	50,756	43,441	38,501	34,884	32,093	29,856	28,013	26,461	25,131	23,976
	650'	700'	750'	800'	850'	900'	950'	1000'	1100'	1200'	1300'	1400'
½	349	335	323	312	302	293	284	277	263	251	240	231
¾	730	701	676	653	632	612	595	578	549	524	502	482
1	1,375	1,321	1,273	1,229	1,190	1,153	1,120	1,089	1,035	987	945	908
1¼	2,824	2,713	2,614	2,524	2,442	2,368	2,300	2,237	2,124	2,027	1,941	1,865
1½	4,231	4,065	3,916	3,781	3,659	3,548	3,446	3,351	3,183	3,037	2,908	2,794
2	8,149	7,828	7,542	7,283	7,048	6,833	6,636	6,455	6,130	5,848	5,600	5,380
2½	12,988	12,477	12,020	11,608	11,233	10,891	10,577	10,288	9,771	9,321	8,926	8,575
3	22,960	22,057	21,249	20,520	19,858	19,253	18,698	18,187	17,273	16,478	15,780	15,160
4	46,830	44,990	43,342	41,855	40,504	39,271	38,139	37,095	35,231	33,611	32,186	30,921
	1500'	1600'	1700'	1800'	1900'	2000'	2100'	2200'	2300'	2400'	2500'	2600'
½	222	214	208	201	195	190	185	181	176	172	168	165
¾	464	449	434	421	409	398	387	378	369	360	352	345
1	875	845	818	793	770	749	729	711	694	678	664	650
1¼	1,796	1,735	1,679	1,628	1,581	1,537	1,497	1,460	1,425	1,393	1,363	1,334
1½	2,691	2,599	2,515	2,439	2,368	2,303	2,243	2,188	2,136	2,087	2,042	1,999
2	5,183	5,005	4,844	4,696	4,561	4,436	4,321	4,213	4,113	4,020	3,932	3,849
2½	8,261	7,978	7,720	7,485	7,270	7,071	6,886	6,715	6,556	6,406	6,267	6,135
3	14,605	14,103	13,648	13,233	12,851	12,500	12,174	11,871	11,589	11,326	11,078	10,846
4	29,789	28,766	27,838	26,991	26,213	25,495	24,831	24,214	23,639	23,100	22,596	22,121
5	53,892	52,043	50,363	48,830	47,422	46,124	44,923	43,806	42,765	41,792	40,879	40,021
6	87,263	84,269	81,550	79,067	76,787	74,686	72,740	70,932	69,247	67,671	66,193	64,803

TABLE NO. 8—FOR PROPANE GAS PRESSURE OF 10.0 psi WITH MAXIMUM PRESSURE DROP OF 3.0 psi
Maximum Delivery Capacity in Cubic Feet of Gas per Hour of I.P.S. Pipe of Different Diameters
and Lengths Carrying Propane Gas of 1.52 Specific Gravity

PIPE SIZE (In inches)	LENGTH OF PIPE (In Feet)											
	50'	100'	150'	200'	250'	300'	350'	400'	450'	500'	550'	600'
½	1,000	690	550	470	420	380	350	325	300	285	272	260
¾	2,070	1,423	1,142	978	867	785	722	672	631	596	566	540
1	3,899	2,680	2,152	1,842	1,632	1,479	1,361	1,266	1,188	1,122	1,066	1,017
1¼	8,005	5,502	4,418	3,782	3,351	3,037	2,794	2,599	2,439	2,303	2,188	2,087
1½	11,994	8,244	6,620	5,666	5,022	4,550	4,186	3,894	3,654	3,451	3,278	3,127
2	23,100	15,877	12,750	10,912	9,671	8,763	8,062	7,500	7,037	6,647	6,313	6,023
2½	36,818	25,305	20,321	17,392	15,414	13,966	12,849	11,953	11,215	10,594	10,062	9,599
3	65,088	44,734	35,923	30,746	27,249	24,690	22,714	21,131	19,827	18,728	17,787	16,969
	650'	700'	750'	800'	850'	900'	950'	1000'	1100'	1200'	1300'	1400'
½	250	240	230	222	215	208	202	198	188	180	171	164
¾	517	496	478	462	447	433	421	409	389	371	355	341
1	973	935	901	870	842	816	793	771	732	699	669	643
1¼	1,999	1,920	1,850	1,786	1,729	1,676	1,628	1,583	1,504	1,434	1,374	1,320
1½	2,995	2,877	2,772	2,676	2,590	2,511	2,439	2,372	2,253	2,149	2,058	1,977
2	5,767	5,541	5,338	5,155	4,988	4,836	4,697	4,568	4,339	4,139	3,964	3,808
2½	9,192	8,831	8,507	8,215	7,950	7,708	7,486	7,281	6,915	6,597	6,318	6,069
3	16,250	15,611	15,040	14,523	14,055	13,627	13,234	12,872	12,255	11,663	11,169	10,730
4	33,145	31,842	30,676	29,623	28,667	27,795	26,993	26,255	24,935	23,789	22,780	21,885
	1500'	1600'	1700'	1800'	1900'	2000'	2100'	2200'	2300'	2400'	2500'	2600'
½	158	152	148	143	139	136	133	130	127	124	121	118
¾	329	317	307	298	289	281	274	267	261	255	249	244
1	619	598	479	561	545	530	516	503	491	480	470	460
1¼	1,271	1,228	1,138	1,152	1,119	1,088	1,060	1,033	1,009	986	964	944
1½	1,905	1,839	1,780	1,726	1,676	1,630	1,588	1,548	1,512	1,477	1,445	1,415
2	3,669	3,543	3,428	3,324	3,228	3,140	3,058	2,982	2,911	2,845	2,783	2,724
2½	5,847	5,646	5,464	4,298	5,145	5,004	4,874	4,753	4,640	4,534	4,435	4,342
3	10,337	9,982	9,660	9,366	9,096	8,847	8,616	8,402	8,203	8,016	7,841	7,676
4	21,083	20,360	19,705	19,103	18,552	18,045	17,575	17,138	16,731	16,350	15,993	15,657
5	38,143	36,834	35,645	34,560	33,564	32,645	31,795	31,005	30,268	29,579	28,933	28,325
6	61,762	59,643	57,718	55,961	54,348	52,860	51,483	50,204	49,011	47,895	46,849	45,865

**TABLE NO. 9—MINIMUM DEMAND FACTORS FOR CALCULATING
GAS PIPING SYSTEMS IN MOBILE HOME PARKS**

NUMBER OF MOBILE HOME SITES	DEMAND FACTOR Btu/h MOBILE HOME SITE
1	125,000
2	117,000
3	104,000
4	96,000
5	92,000
6	87,000
7	83,000
8	81,000
9	79,000
10	77,000
11-20	66,000
21-30	62,000
31-40	58,000
41-60	55,000
Over 60	50,000